

# Solar Electric Propulsion for Earth Observation Satellites

Dan M. Goebel

Jet Propulsion Laboratory, California Institute of Technology

Pasadena, CA

Earth observation satellites for climate change monitoring, scientific missions and defense applications require on-board propulsion systems that have significant capability and performance for station keeping, drag reduction and orbit changes. The high specific impulse (Isp) capabilities of solar electric propulsion systems greatly reduce the amount of propellant that must be carried to complete the mission, but often at the expense of longer time durations for the required maneuvers. The development of electric thrusters and solar power systems at different power levels, combined with the advancing maturity of these technologies based on commercial communications satellites, makes SEP attractive for many of these emerging applications.

Dan M. Goebel received a B.S. in physics, an M.S. in electrical engineering, and a Ph.D. in applied plasma physics from the University of California, Los Angeles, in 1977, 1978 and 1981 respectively. He is a Senior Research Scientist at Jet Propulsion Laboratory where he is responsible for the development of high efficiency ion thrusters, advanced long life components such as cathodes and grids, and thruster life model validation for deep space missions. Previously he was a Research Scientist at HRL Laboratories in Malibu, CA and Boeing EDD in Torrance, CA where he was the supervisor of the Advanced Technology Group for microwave tube development and the lead scientist of the XIPS ion thruster program for commercial satellite station keeping. Dr. Goebel is a Fellow of the IEEE, Associate Fellow of the AIAA, Chair of the AIAA Electric Propulsion Technical Committee, and Life Member of the APS and Sigma Xi. He is the author of over 110 technical papers, one book entitled *Fundamentals of Electric Propulsion: Ion and Hall Thrusters* published by J.Wiley and Sons in 2008, and holds 40 patents.